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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,821	11/12/2003	William Randolph Stowell	13DV-14167 (07783-0159)	8820

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EXAMINER	
SAVAGE, JASON L	
ART UNIT	**PAPER NUMBER**
1775	

DATE MAILED: 03/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/712,821	STOWELL ET AL.	
	Examiner	Art Unit	
	Jason L. Savage	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 07 April 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 20031112, 20050420.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 4-20-05 was considered however reference D was not initialed since the patent publication number for the Skoog reference is not in a valid format. The reference has been cited on the attached PTO-892 with the correct formatting to insure the reference is properly identified.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 8, 11-13 and 15-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Bornstein et al (US 6,060,177) as evidenced by the disclosure in the instant application.

Bornstein teaches a superalloy component comprising a superalloy-substrate, an alumina-containing bond coat on the substrate, an adherent layer of ceramic material for forming a thermal barrier and a topcoat layer applied to the thermal barrier (col. 2, ln. 59-65).

Regarding the limitation that the topcoat is a heat-absorbing layer, Bornstein further teaches that the topcoat enhances black body radiation of heat from the coating which reduces the temperature of the underlying component (col. 8, ln. 1-3). Furthermore, Bornstein teaches the topcoat is composed of alumina and chromia (col.

3, ln. 11-20). As was disclosed by Applicant in the specification in paragraph [0011], exemplary topcoat heat-adsorbing materials include alumina and chromia. As such, the alumina and chromia coating of Bornstein which enhances heat radiation and reduces the temperature of the underlying component would meet the limitation that the material of being heat-absorbing.

Regarding the limitation that the heat-absorbing topcoat is comprised of a thermal decomposition product of a mixture of at least one metallic element and at least one ceramic precursor binder component, Bornstein is silent to the claim limitation. However, the claims are drawn to the product, not the method of making. Absent a teaching of the criticality of the claimed method of forming the topcoat layer, it would not provide a patentable distinction over the prior art. As was disclosed in the specification in paragraph [0012], the topcoat may be applied by any of several methods including deposition as a film by CVD, PVD, plasma spray and sputtering as alternatives to the method steps recited in the claim. As such, the coating of Bornstein which is recited to be formed by any suitable manner including plasma spraying (col. 4, ln. 28-33) would have anticipated the coating which claimed by Applicant.

In the alternative, it would have been within the purview of one of ordinary skill in the art at the time of the invention to have formed the topcoat by any suitable method which is known in the art including the claimed method of forming a mixture of a metallic element and a binder and thermally decomposing the mixture with a reasonable expectation of success.

Regarding claims 2-3 and 16-17, Bornstein teaches the topcoat thickness may be 2-10 mils thick (col. 4, ln. 6-19) which overlaps and anticipates the ranges claimed by Applicant between 2-10 miles in claims 2 and 16 and 8-10 mils in claims 3 and 17.

Regarding claim 8, the claims are drawn to the article, not the method of making. Given Bornstein teaches the coating is applied by plasma spraying one would have expected it to have been just as continuous as the sprayed layer claimed by Applicant. Bornstein further teaches that the alumina and chromia in the topcoat are fused, further supporting the position that the coating is continuous (col. 6, ln. 4-5).

Regarding claims 11-13, Bornstein teaches that the surface roughness of the thermal barrier coating is set and adjusted to have a predetermined roughness of between 80-125 microinches (col. 4, ln. 62-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-7, 14 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bornstein as evidenced by the disclosure in the instant application.

Regarding claims 5-6 and 14, the prior art teaches what is set forth above however it is silent to the limitation that the binder is selected from the claimed

materials. However, the claims are drawn to an article, not the method of making. Absent a teaching of the criticality of the claimed method and binding materials for forming the topcoat layer, it would not provide a patentable distinction over the prior art. As was disclosed in the specification in paragraph [0012], the topcoat may be applied by any of several methods including deposition as a film by CVD, PVD, plasma spray and sputtering as alternatives to the method steps recited in the claim. As such, the plasma sprayed coating of Bornstein would meet the claim limitations of the formed product.

Regarding claim 7, Bornstein teaches that the ceramic thermal barrier coating layer may be a yttrium-stabilized zirconia (col. 7, ln. 60-67) but it is silent to the yttrium content. However, providing a yttrium-stabilized zirconia having the claimed yttrium content would have been obvious since 6-8% yttrium-stabilized zirconia is known to be a conventional composition for thermal barrier coatings.

Regarding claims 20-22, Borstein is silent to the superalloy component comprising a flowpath part of a gas turbine. However, it teaches that the superalloy component is used as turbine components (col. 1, ln. 7-35). As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the coating of Borstein on any turbine component including flowpath components with a reasonable expectation of success.

Claims 9-10 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bornstein in view of Skoog et al. (US 6,210,791).

Bornstein teaches what is set forth above however it is silent to the topcoat comprising two thin layers of heat-absorbing material wherein the two layers may further comprise different material.

Skoog teaches a superalloy component comprising a superalloy substrate **22**, a bond coat **24**, a thermal barrier coating **26**, a first topcoat layer **30** and a second low-emissivty topcoat **31** (col. 5, ln. 17 – col. 6, ln. 67 and Figure 2). Skoog further teaches that the combination of the first topcoat and the second low emissivity topcoat provides improved performance to the coated article (col. 2, ln. 5-18).

It would have been obvious to one of ordinary skill in the art to have modified the article of Bornstein by following the teachings of Skoog and provided a low emissivity coating thereon with a reasonable expectation of success of forming a coating capable of reflecting and reducing some of the thermal energy incident upon the coated article resulting in improved overall performance of the coated component.

Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skoog et al. (US 6,210,791)

Skoog teaches a superalloy component comprising a superalloy substrate **22**, a bond coat **24**, a thermal barrier coating **26**, a first topcoat layer **30** and a second low-emissivty topcoat **31** (col. 5, ln. 17 – col. 6, ln. 67 and Figure 2). Skoog further teaches that first topcoat layer **30** is formed by mixing metallic elements such as alumina and a binder such as silicone and spraying (col. 7, ln. 6-25). Skoog also teaches that the topcoat mixture is subsequently heated to produce the diffuse reflective topcoat (col. 9,

ln. 1-8). Such a heating step would result in a similar thermal decomposition of the coating mixture to form the heat-absorbing topcoat layer as that claimed by Applicant since Skoog teaches the same metallic elements and same precursor binding component as that claimed.

Skoog is silent to the bond coat **24** being an alumina-containing bond coat. However, Skoog teaches that the bond coat is preferably formed from a variety of aluminum containing alloys (col. 6, ln. 17-49). It is known in the art to form an alumina-containing surface layer on the bond coat in order to improve the adhesion of the thermal barrier coat. As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to have treated the aluminum containing bond coat layers of Skoog to have an alumina containing surface layer in order to insure the thermal barrier coating was suitably adhered to the coated superalloy component.

Regarding claims 2-3 and 16-17, Skoog teaches that the dual layer top coating may have thicknesses between 0.9 mils to 1.7 mils (col. 5, ln. 9-12). Although this is outside of the range claimed which recites the thickness may be 2 mils in claims 2 and 16 and 8 mils in claims 3 and 17, it would have been within the purview of one of ordinary skill in the art to have selected thicknesses which were sufficient to suitably protect the substrate. Absent a teaching of the criticality or showing of unexpected results due to the coatings having the recited thicknesses, it would not provide a patentable distinction over the prior art.

Regarding claims 4 and 22, Skoog teaches that in addition to alumina, the metallic element may be hafnia, tantala, silica and other rare earth oxides (col. 8, ln. 58-64).

Regarding claim 5, Skoog teaches the bind may be silicone (col. 7, ln. 7-25).

Regarding claims 6 and 14, Skoog teaches that prior to thermal decomposition, the topcoat may comprise a mixture of from 1 to 55 wt% of the ceramic precursor binder and the remainder comprising primarily the metallic element (col. 7, ln. 26-46). The topcoat having a mixture of 25-55 wt% of the ceramic precursor and the balance substantially comprising the metallic element as disclosed by Skoog would meet the claim limitations.

Regarding claim 7, Skoog teaches the ceramic material layer comprise 4-8% yttria-stabilized zirconia (col. 6, ln. 50-64).

Regarding claims 8 and 21, the top coating of Skoog would have been as continuous as the layer claimed by Applicant since Skoog teaches the same metallic elements and precursor binding component as that claimed.

Regarding claims 9-10 and 18-19, Skoog teaches that the topcoat may comprise two layers of heat-absorbing material (**30**, **31**) wherein the two layers comprise a different metallic element such as alumina in the first topcoat **30** and tantala or silica in the second topcoat **31** (col. 9, ln. 9-24).

Regarding claims 11 and 13, Skoog teaches the thermal barrier coating preferably has a predetermined roughness which may be formed by surface finishing steps (col. 6, ln. 50-64).

Regarding claim 12, although Skoog is silent to the surface roughness of the thermal barrier coating, setting the surface roughness to be within the range claimed by Applicant would have been obvious. One of ordinary skill in the art would have been motivated to provide the thermal barrier coating with such a roughness since it is known to provide bonds between thermal barrier and topcoat layers having a suitable strength.

Regarding claim 20, Skoog teaches the superalloy article may be a flowpath part from a gas turbine ((col. 1, ln. 25-27).

Prior Art Made of Record but not Relied Upon

Rigney et al. (US 6,586,115) teaches that coatings of 6-8% yttrium-stabilized zirconia are conventional prior art thermal barrier coating materials for superalloy components (abs.).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason L. Savage whose telephone number is 571-272-1542. The examiner can normally be reached on M-F 6:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason Savage
3-9-06

JENNIFER MCNEIL
PRIMARY EXAMINER
3/12/06